

Significance of Bike-Frame Geometric Factors for Cycling Efficiency and Muscle Activation

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Abstract : With the advocacy of green transportation and green traveling, cycling has become increasingly popular nowadays. Physiology and bike design are key factors for the influence of cycling efficiency. Therefore, this study aimed to investigate the significance of bike-frame geometric factors on cycling efficiency and muscle activation for different body sizes of non-professional Asian male cyclists. Participants who represented various body sizes, as measured by leg and back lengths, carried out cycling tests using a tailor-assembled road bike with different ergonomic design configurations including seat-height adjustments (i.e., 96%, 100%, and 104% of trochanteric height) and bike frame sizes (i.e., small and medium frames) for an assessable distance of 1 km. A specific power meter and self-developed adaptable surface electromyography (sEMG) were used to measure average pedaling power and cadence generated and muscle activation, respectively. The results showed that changing the seat height was far more significant than the body and bike frame sizes. The sEMG data evidently provided a better understanding of muscle activation as a function of different seat heights. Therefore, the interpretation of this study is that the major bike ergonomic design factor dominating the cycling efficiency of Asian participants with different body sizes was the seat height.

Keywords : bike frame sizes, cadence rate, pedaling power, seat height

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